



# GRAIN INSPECTION, PACKERS AND STOCKYARDS ADMINISTRATION

Technical Services Division

January 2001

## U.S. RICE INSPECTION

### RICE TYPES

**Rough Rice or Paddy Rice** is rice as it comes from the field with the kernels still in the hull. For inspection purposes Rough Rice is defined as: Rice (*Oryza sativa* L.) which consist of 50% or more of paddy kernels of rice. **Paddy Kernels** are (un-hulled kernels) present in Brown or Milled rice. The outer hull must be removed before rice can be packaged or cooked.

**Brown Rice** is rough rice that has passed through a sheller to remove the hulls. For inspection purposes Brown Rice is defined as: Rice (*Oryza sativa* L.) which consists of more than 50.0 percent of kernels of brown rice and which is intended for processing to milled rice.

The light brown color of brown rice is due to bran layers which are rich with minerals and vitamins, especially the B-complex group. Brown rice contains slightly more fiber, Vitamin E, phosphorus, and calcium than milled rice.

Brown Rice may be consumed as is or milled into white rice. Cooked brown rice has a slightly chewy texture and a nut-like flavor.

**Milled Rice** is rice that has both the hull and bran layers removed. It is sometimes referred to as milled rice, white rice, polished rice, or polished white rice.

For inspection purposes milled rice is defined as: Whole or broken kernels of rice (*Oryza sativa* L.) from which the hulls and at least the outer bran layers have been removed and which contain not more than 10.0 percent of seeds, paddy kernels, or foreign material, either singly or combined.

To remove the bran layers from brown rice, the rice is milled by machines that rub the grains together under pressure, revealing the white

rice. Most white rice is enriched, giving it a nutritional value similar to brown rice. In addition, white rice provides more thiamine and iron than brown rice.

### CLASSES

**Long Grain Rice.** Long-grain rice has long, slender kernels, about 4 times longer than it is wide. Cooked grains are separate, light and fluffy.

**Medium Grain Rice.** Medium-grain Rice is 2.5 to 3 times longer than it is wide. Cooked grains are moist, tender and slightly clingy.

**Short Grain Rice.** The kernels of Short-grain Rice are 1.1 to 2 times longer than it is wide. Cooked grains cling together.

### MILLING FACTORS

**Milling Yield.** Milling yield is an estimate of the quantity of whole kernels and total milled rice (whole and broken kernels combined) that are produced in the milling of rough or brown rice to a well-milled degree.

The milling quality of rice is based on the percent of whole kernel of milled rice obtained because this is usually the product of greatest economic value.

Milling yields vary widely, depending on factors like the variety, grain type, chalkiness, drying, storing, etc.

**Color.** The color of milled rice may vary, from shades of white, creamy, gray, or rosy. In the U.S. standards, color limits the grades that can be applied. For instance, U.S. No. 1 must be white or creamy, but a U.S. No. 3 may be lightly gray.

## GRADES AND GRADE REQUIREMENTS FOR ROUGH RICE

Grading Factors	Grades U.S. Nos.					
	1	2	3	4	5	6
<b>Maximum number in 500 grams</b>						
Seeds and Heat-Damaged Kernels Total (Singly or Combined).....	4	7	10	27	37	75
Heat-Damaged Kernels and Objection- able Seeds (Singly or Combined).....	3	5	8	22	32	75.
Heat-Damaged Kernels.....	1	2	5	15	25	75
<b>Maximum limit (percent)</b>						
Red Rice and Damaged Kernels (Singly Or Combined) <u>4/</u> .....	0.5	1.5	2.5	4.0	6.0	15.0
Chalky Kernels <u>1/</u> <u>2/</u> in Long Grain.....	1.0	2.0	4.0	6.0	10.0	15.0
in Medium or Short Grain .....	2.0	4.0	6.0	8.0	10.0	15.0
Other Types <u>3/</u> .....	1.0	2.0	3.0	5.0	10.0	10.0
<b>Minimum Requirement</b>						
Color <u>1/</u> .....	No. 1 Shall be white or creamy . No. 2 May be slightly gray. No. 3 May be light gray. No. 4 May be gray or slightly rosy. No. 5 May be dark gray or rosy. No. 6 May be dark gray or rosy.					
U.S. Sample grade shall be rough rice which:						
(a) does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 6, inclusive;						
(b) contains more than 14.0 percent of moisture;						
(c) is musty or sour, or heating;						
(d) has a commercially objectionable foreign odor; or						
(e) is otherwise of distinctly low quality.						
<u>1/</u> For the special grade Parboiled rough rice.						
<u>2/</u> For the special grade Glutinous rough rice.						
<u>3/</u> These limits do not apply to the class Mixed Rough Rice.						
<u>4/</u> Rice in grade U.S. No. 6 shall contain not more than 6.0 percent of damaged kernels.						

**GRADES AND GRADE REQUIREMENTS FOR BROWN RICE**

Grading Factors	Grades U.S. Nos.				
	1	2	3	4	5
	Maximum number in 500 grams				
Paddy Kernels .....	20	-	-	-	-
Seeds and Heat-Damaged Kernels Total (Singly or Combined) .....	10	40	70	100	150
Heat-Damaged Kernels .....	1	2	4	8	15
Objectionable Seeds .....	2	10	20	35	50
	Maximum limit (percent)				
Paddy Kernels	-	2.0	2.0	2.0	2.0
Red Rice and Damaged Kernels (Singly or Combined) .....	1.0	2.0	4.0	8.0	15.0
Chalky Kernels <u>1/</u> <u>2/</u> .....	2.0	4.0	6.0	8.0	15.0
Broken Kernels Removed by a 6 Plate or 6 Sieve <u>3/</u> .....	1.0	2.0	3.0	4.0	6.0
Other Types <u>4/</u> .....	1.0	2.0	5.0	10.0	10.0
Well-Milled Kernels .....	1.0	3.0	10.0	10.0	10.0
<p>U.S. Sample grade shall be rough rice which:</p> <p>(a) does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 5, inclusive;</p> <p>(b) contains more than 14.5 percent of moisture;</p> <p>(c) is musty or sour, or heating;</p> <p>(d) has a commercially objectionable foreign odor;</p> <p>(e) contains more than 0.2 percent of related material or more than 0.1 percent of unrelated material;</p> <p>(f) contains 2 or more live weevils or other live insects; or</p> <p>(g) is otherwise of distinctly low quality.</p>					
<p><u>1/</u> For the special grade Parboiled brown rice.</p> <p><u>2/</u> For the special grade Glutinous brown rice.</p> <p><u>3/</u> Plates should be used for southern production rice and sieves should be used for western production rice, but any device or method which gives equivalent results may be used.</p> <p><u>4/</u> These limits do not apply to Mixed Brown Rice for Processing.</p>					



**GRADES AND GRADE REQUIREMENTS FOR MILLED RICE**  
**Second Head Milled Rice**

Grading Factors	Grades U.S. Nos.				
	1	2	3	4	5
Seeds, Heat-Damaged, and Paddy Kernels Total (Singly or Combined) ..... Heat-Damaged Kernels and Objectionable Seeds (Singly or Combined) .....	Maximum number in 500 grams				
	15	20	35	50	75
Red Rice and Damaged Kernels (Singly or Combined) <u>5/</u> <u>6/</u> ..... Chalky Kernels <u>1/</u> <u>2/</u> .....	Maximum limit (percent)				
	1.0	2.0	3.0	5.0	10.0
	4.0	6.0	10.0	15.0	20.0
Minimum level					
Color <u>1/</u>			Milling Requirement <u>5/</u>		
U.S. No. 1	Shall be white or creamy		Well Milled		
U.S. No. 2	May be slightly gray.		Well Milled		
U.S. No. 3	May be light gray.		Reasonably Well Milled		
U.S. No. 4	May be gray or slightly rosy.		Reasonably Well Milled		
U.S. No. 5	May be dark gray or rosy.		Lightly Milled		
U.S. Sample grade shall be rough rice which: <ul style="list-style-type: none"> <li>(a) does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 6, inclusive;</li> <li>(b) contains more than 15.0 percent of moisture;</li> <li>(c) is musty or sour, or heating;</li> <li>(d) has a commercially-objectionable foreign odor;</li> <li>(e) contains more than 0.1 percent of foreign material;</li> <li>(f) contains two or more live or dead weevils or other live insects, insect webbing, or insect refuse; or</li> <li>(g) is otherwise of distinctly low quality.</li> </ul>					
<u>1/</u> For the special grade Parboiled milled rice. <u>2/</u> For the special grade Glutinous milled rice. <u>3/</u> Plates should be used for southern production rice and sieves should be used for western production rice, but any device or method which gives equivalent results may be used. <u>4/</u> These limits do not apply to the class Mixed Milled Rice. <u>5/</u> For the special grade Undermilled milled rice. <u>6/</u> Grade U.S. No. 6 shall contain not more than 6.0 percent damaged kernels.					

**GRADES AND GRADE REQUIREMENTS FOR MILLED RICE**  
**Screenings Milled Rice**

Grading Factors	Grades U.S. Nos. <u>4/ 5/</u>				
	1	2	3	4	5
Paddy Kernels and Seeds Total (Singly or Combined) .....	30	75	125	175	250
Objectionable Seeds .....	20	50	90	140	200
Chalky Kernels <u>1/ 2/</u> .....	5.0	8.0	12.0	20.0	30.0
Minimum level					
Color <u>1/</u>			Milling Requirement <u>5/</u>		
U.S. No. 1	Shall be white or creamy		Well Milled		
U.S. No. 2	May be slightly gray.		Well Milled		
U.S. No. 3	May be light gray.		Reasonably Well Milled		
U.S. No. 4	May be gray or slightly rosy.		Reasonably Well Milled		
U.S. No. 5	May be dark gray or rosy.		Lightly Milled		
<p>U.S. Sample grade shall be milled rice which:</p> <p>(a) does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 5, inclusive;</p> <p>(b) contains more than 15.0 percent of moisture;</p> <p>(c) is musty or sour, or heating;</p> <p>(d) has a commercially-objectionable foreign odor;</p> <p>(e) has a badly damaged or extremely red appearance;</p> <p>(f) contains more than 0.1 percent of related material;</p> <p>(g) contains two or more live or dead weevils or other live insects, insect webbing, or insect refuse; or</p> <p>(h) is otherwise of distinctly low quality.</p>					
<p><u>1/</u> For the special grade Parboiled milled rice.</p> <p><u>2/</u> For the special grade Undermilled milled rice.</p> <p><u>3/</u> For the special grade Glutinous milled rice.</p> <p><u>4/</u> Grades U.S. No. 1 to U.S. No. 4, inclusive, shall contain not more than 3.0 percent of heat-damaged kernels, kernels damaged by heat, and parboiled kernels in nonparboiled rice.</p> <p><u>5/</u> Grades U.S. No. 1 to U.S. No. 4, inclusive, shall contain not more than 1.0 percent of material passing through a 30 sieve.</p>					

**GRADES AND GRADE REQUIREMENTS FOR MILLED RICE**  
**Brewers Milled Rice**

Grading Factors	Grades U.S. Nos. <u>3/ 4/</u>				
	1	2	3	4	5
Paddy Kernels and Seeds Total (Singly or Combined) .....	0.5	1.0	1.5	3.0	5.0
Objectionable Seeds .....	0.05	0.1	0.2	0.4	1.5
Minimum level					
Color <u>1/</u>			Milling Requirement <u>5/</u>		
U.S. No. 1	Shall be white or creamy		Well Milled		
U.S. No. 2	May be slightly gray.		Well Milled		
U.S. No. 3	May be light gray.		Reasonably Well Milled		
U.S. No. 4	May be gray or slightly rosy.		Reasonably Well Milled		
U.S. No. 5	May be dark gray or rosy.		Lightly Milled		
<p>U.S. Sample grade shall be milled rice of this class which:</p> <ul style="list-style-type: none"> <li>(a) does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 5, inclusive;</li> <li>(b) contains more than 15.0 percent of moisture;</li> <li>(c) is musty or sour, or heating;</li> <li>(d) has a commercially-objectionable foreign odor;</li> <li>(e) has a badly damaged or extremely red appearance;</li> <li>(f) contains more than 0.1 percent of related material;</li> <li>(g) contains more than 15.0 percent of broken kernels that will pass through a 22 sieve.</li> <li>(h) contains two or more live or dead weevils or other live insects, insect webbing, or insect refuse; or</li> <li>(i) is otherwise of distinctly low quality.</li> </ul>					
<p><u>1/</u> For the special grade Parboiled milled rice.</p> <p><u>2/</u> For the special grade Undermilled milled rice.</p> <p><u>3/</u> Grades U.S. No. 1 to U.S. No. 4, inclusive, shall contain not more than 3.0 percent of heat-damaged kernels, kernels damaged by heat, and parboiled kernels in nonparboiled rice.</p> <p><u>4/</u> Grades U.S. No. 1 to U.S. No. 4, inclusive, shall contain not more than 1.0 percent of material passing through a 30 sieve. This limit does not apply to the special grade Granulated brewers milled rice.</p>					

## SPECIAL GRADES AND SPECIAL GRADE REQUIREMENTS

### ROUGH RICE

**Infested rough rice.** Rough rice that contains 2 or more live weevils or 10 other live insects which are injurious to stored grain. NOTE: In **brown rice**, the presence of 2 or more live insects requires application of the *Sample Grade* designation, while in **milled rice**, the presence of 2 insects, living or dead, requires application of the *Sample Grade* designation.

**Parboiled rough rice.** Rough rice in which the starch has been gelatinized by soaking, steaming, and drying. If the rice is:

- (a) Not distinctly colored by the parboiling process, the rice shall be considered “**Parboiled Light;**”
- (b) Distinctly but not materially colored by the parboiling process, the rice shall be considered “**Parboiled;**”
- (c) Materially colored by the parboiling process, the rice shall be considered “**Parboiled Dark.**”

**Smutty rough rice.** Rough rice which contains more than 3.0 percent of smutty kernels.

**Glutinous rough rice.** Special varieties of rice which contain more than 50 percent chalky kernels.

**Aromatic rough rice.** Special varieties of rice that have a distinctive and characteristic aroma; e.g., basmati and jasmine rice.

### BROWN RICE

**Parboiled brown rice for processing.** Brown rice for processing in which the starch has been gelatinized by soaking, steaming, and drying.

**Smutty brown rice for processing.** Brown rice for processing which contains more than 3.0 percent of smutty kernels.

**Glutinous brown rice for processing.** Special varieties of rice which contain more than 50 percent of chalky kernels.

**Aromatic brown rice for processing.** Special varieties of rice that have a distinctive and characteristic aroma; e.g., basmati and jasmine.

### MILLED RICE

**Coated milled rice.** Coated milled rice shall be rice which is coated, in whole or in part, with substances that are safe and suitable as defined in the regulations issued pursuant to the Federal Food, Drug, and Cosmetic Act.

**Granulated brewers milled rice.** Granulated brewers milled rice shall be milled rice which has been crushed or granulated so that 95.0 percent or more will pass through a 5 sieve, 70.0 percent or more will pass through a 4 sieve, and not more than 15.0 percent will pass through a 22 sieve.

**Parboiled milled rice.** Parboiled milled rice shall be milled rice in which the starch has been gelatinized by soaking, steaming, and drying. If the rice is:

- (a) Not distinctly colored by the parboiling process, the rice shall be considered “**Parboiled Light;**”
- (b) Distinctly but not materially colored by the parboiling process, the rice shall be considered “**Parboiled.**”
- (c) Materially colored by the parboiling process, the rice shall be considered “**Parboiled Dark.**”

**Undermilled milled rice.** Undermilled milled rice shall be milled rice which is not equal to the milling requirements for well-milled, reasonably well milled and lightly milled rice.

**Glutinous milled rice.** Special varieties of rice which contain more than 50 percent of chalky kernels.

**Aromatic milled rice.** Special varieties of rice that have a distinctive and characteristic aroma; e.g., basmati and jasmine rice.

# GLOSSARY OF RICE FACTORS

**BROKEN KERNELS.** Kernels of rice which are less than three-fourths of whole kernels.



**CHALKY KERNELS.** Kernels lacking translucency (opaque; impervious to the rays of visible light. Chalky when ½ or more of the kernel is not translucent (white).

**FOREIGN MATERIAL (MILLED RICE).** All matter other than rice and seeds, hulls, germs, and bran which have separated from the kernels of rice shall be considered foreign material.



**HEAT (Damage).** Kernels are materially discolored as a result of heating. Also includes parboiled kernels in nonparboiled rice which are as dark as or darker in color than the illustration.



**PECK (Damage).** Whole and large broken kernels of rice that have one or more black, brown, red, or other discolored spots, or area on them caused by fungus growth or insect. Kernel spots (peck) increase during periods of high humidity and the second rice crop is usually more severely affected. Injury to developing kernels (i.e., stink bug) can predispose the kernel to fungal infection. Peck can reduce the yield of head rice.



**OBJECTIONABLE SEEDS.** Seeds other than rice, except seeds of *echinocloa crusgalli* (i.e., barnyard grass, watergrass, Japanese millet).



A B C

**OTHER DAMAGE.** Whole or broken kernels with any discernible discoloration caused by water, insect, or other means shall be damage. Kernel A shows a water spot (ring). Kernel B shows a stain spot. Kernel C shows an insect peck spot.



**PADDY KERNELS.** Whole or broken unhulled kernels of rice; whole or broken kernels of Brown rice, and whole or broken kernels of Milled rice having a portion or portions of the hull remaining which cover one-eighth (1/8) or more of the whole or broken kernels.



**RED RICE DAMAGE.** When a kernel of rice — whole or broken — has an appreciable amount of red bran it is considered damaged.

**SEEDS.** Whole or broken seeds of any plant other than rice.



**SMUT (Kernel Smut).** Kernel smut is a fungal disease that affects the kernels of rice and is generally caused by *Tilletia barclayana*. In rice, the endosperm of the kernels turn into black masses of spores which can be disseminated by wind, rain, and contact. Moisture causes the smut spores to swell and break out of the hull. Smut spores give milled rice a grayish color. Frequent rains during the flowering period cause more severe disease infestations.